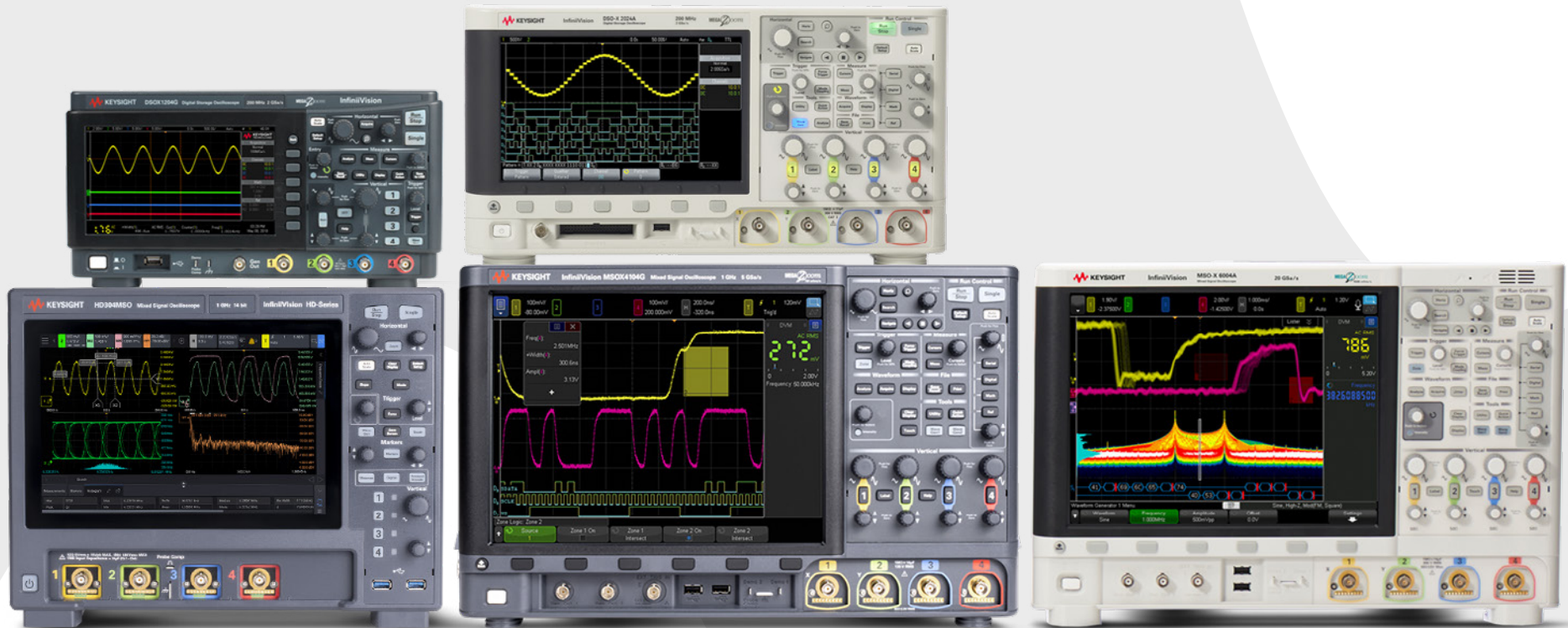# Engineering Essentials Oscilloscopes

CATALOG

![KEYSIGHT logo]

Table of Contents

Get Quality and Confidence with InfiniiVision Oscilloscopes

At times, the job involves enhancing a design's performance, while other times it's simply ensuring functionality. Whatever challenges you face, Keysight InfiniiVision oscilloscopes, with models from 50 MHz to 6 GHz, can help. Whether you use an oscilloscope once a day, once a week, or once a month, InfiniiVision oscilloscopes are ready to inspire quicker insight. Keysight's technology puts automated measurements and accessible expertise at your fingertips.

Why choose an InfiniiVision oscilloscope?

- Spend less time testing with tools like zone touch trigger, automatic settings, and built-in help.
- See more of your signal with uncompromising update rates.
- Get more analysis with multiple instruments in one oscilloscope, including a digital voltmeter, waveform generator (WaveGen), counter, protocol analyzer, digital channels (MSO), and frequency response analyzer (Bode plot).
- Protect your investment by only purchasing the capability you need today with the ability to upgrade your bandwidth, digital channels (MSO), WaveGen capability, and software applications later.

Need an application-specific solution?

InfiniiVision has you covered with software that includes automotive, aerospace and defense, embedded, power, and universal serial bus (USB). Check out our free software trials.

Get quality and confidence with InfiniiVision — and test to impress.

Save 25% on InfiniiVision application bundles for power, jitter, and automotive. Learn more.

Are you looking for higher-performance oscilloscopes?
Check out the High-Performance Digital Products catalog.

InfiniiVision 1000 X-Series Oscilloscopes

The Keysight InfiniiVision 1000 X-Series leverages the same technology we use in our higher-end InfiniiVision family, giving you professional-level measurements you can trust. Now you can get even more functionality with capabilities like four-wire SPI decode and remote connection via LAN. Get the performance you need to measure with confidence.

- Measure frequency response analysis (Bode gain and phase plots), included in models with WaveGen.

- See more signal detail with up to 200,000 waveforms / second update rate.

- Test quickly and easily with a simple, intuitive user interface and built-in help and training signals.

- Get professional-level functionality with software analysis, including standard serial bus analysis for the most popular serial bus standards and 6-in-1 instrument integration.
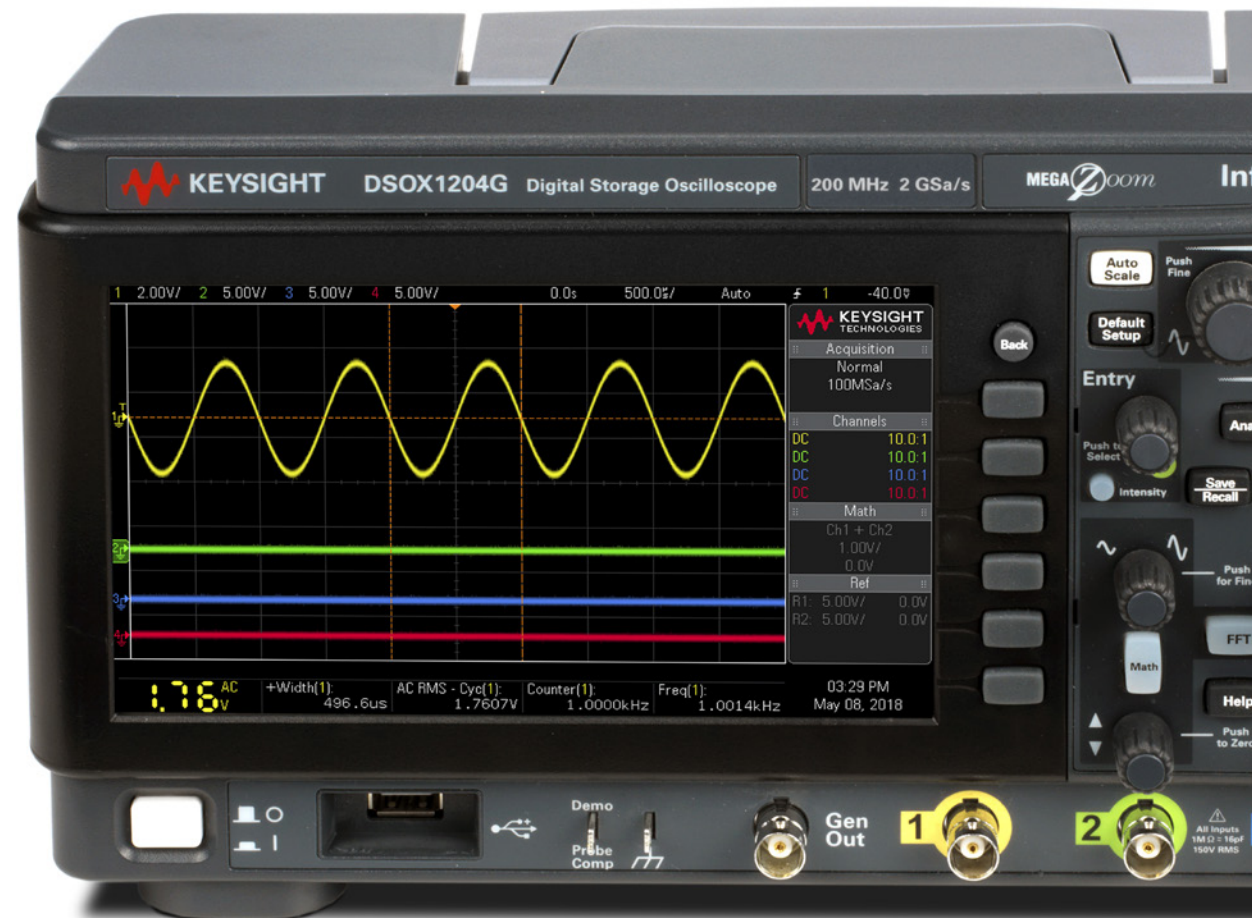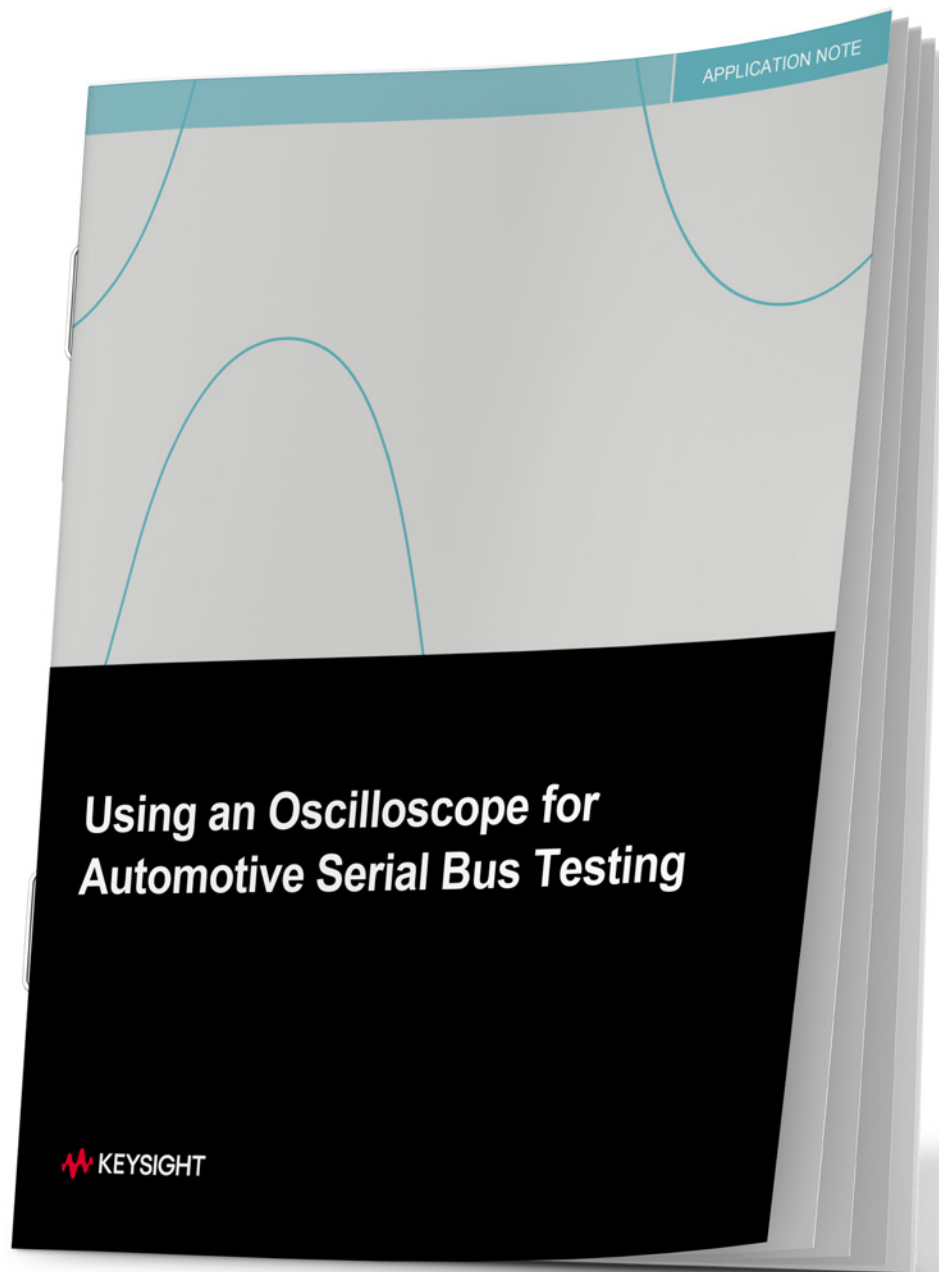
InfiniiVision 1000 X-Series Oscilloscope
Professional-level capabilities in an entry-level instrument

InfiniiVision 1000 X-Series Oscilloscopes

Specifications	EDUX1052A	EDUX1052G	DSOX1202A	DSOX1202G	DSOX1204A	DSOX1204G
Bandwidth	50 MHz		70, 100, 200 MHz			
Channels	2 channels plus external digital channel				4 channels	
Memory	200 k points		2 M points			
Maximum sample rate	1 GSa/s		2 GSa/s			
Integrated instruments	WaveGen (standard on Keysight EDUX1052G, DSOX1202G, and DSOX1204G models only), hardware-based serial protocol decode and triggering, frequency response analyzer (EDUX1052G, DSOX1202G, and DSOX1204G models only), digital voltmeter (DVM), and frequency counter					
Bode plot (FRA)	No	Standard	No	Standard	No	Standard
Mast testing	No		Standard (200,000 tests / second)			
Serial protocols (Standard)	I^2C, RS232 / UART		I^2C, SPI, RS232 / UART, CAN, LIN			
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Using an Oscilloscope for Automotive Serial Bus Testing

KEYSIGHT

Learn how to use oscilloscopes to characterize the performance of your automotive buses, including CAN, CAN FD, LIN, FlexRay, and SENT, with the *Using an Oscilloscope for Automotive Serial Bus Testing* – Application Note.

InfiniiVision HD3 Series Oscilloscopes

The Keysight InfiniiVision HD3 Series performs digital debugging using a portable oscilloscope with a custom application-specific integrated circuit (ASIC) that delivers four times more vertical resolution and half the injected noise of other general-purpose oscilloscopes.

Troubleshoot your design and ensure product quality by debugging with an oscilloscope that can see the small signals beyond the noise to catch the slightest and most infrequent signal glitches.

Separate signal from noise

- Increase vertical resolution by four times with a 14-bit analog-to-digital converter (ADC).
- See smaller signals with a 50 μV_{RMS} noise floor.
- Identify infrequent signal glitches with an uncompromised 1.3 M waveform / second update rate enabled by a custom ASIC.
- Capture longer time spans at full sample rate with 100 Mpts of deep memory.
- Display up to four independent signals and control the scaling individually.
- Isolate signals in seconds with zone triggering — simply draw a box with your finger on the screen.
- Characterize signals, hunt for errors, and save automatically with Keysight Fault Hunter.
- Perform advanced analysis with fast Fourier transforms (FFTs), mask testing, histograms, and Bode plots.

InfiniiVision HD3 Series Oscilloscopes
4x the resolution, 1/2 the noise

InfiniiVision HD3 Series Oscilloscopes

Specifications		HD302MSO	HD304MSO
Bandwidth		200 MHz to 1 GHz options	
Channels	Analog	2	4
	Digital	16	
ADC bits		14-bits	
Noise floor		48 μV_{RMS} noise floor on 50 Ω inputs at 2 mV / div and 1 GHz	
Waveform update rate		Uncompromised 1.3 M waveforms / second	
Memory		20 to 100 Mpts options	
Maximum sample rate		3.2 GSa/s per channel	
Integrated instruments		Digital channels, protocol analyzer, frequency response analyzer, 100-MHz arbitrary waveform generator, three-digit digital voltmeter, and eight-digit counter with totalizer	
Serial protocols options		I²C, SPI, UART (RS232 / 422 / 485), CAN, CAN FD, CAN XL, and LIN	
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There's plenty of information available about oscilloscope basics and high-end features. What about everything in between?

Learn about some of the less talked about oscilloscope functions with the *A Step Beyond the Basics: 6 Advanced Oscilloscope Tips* – eBook.
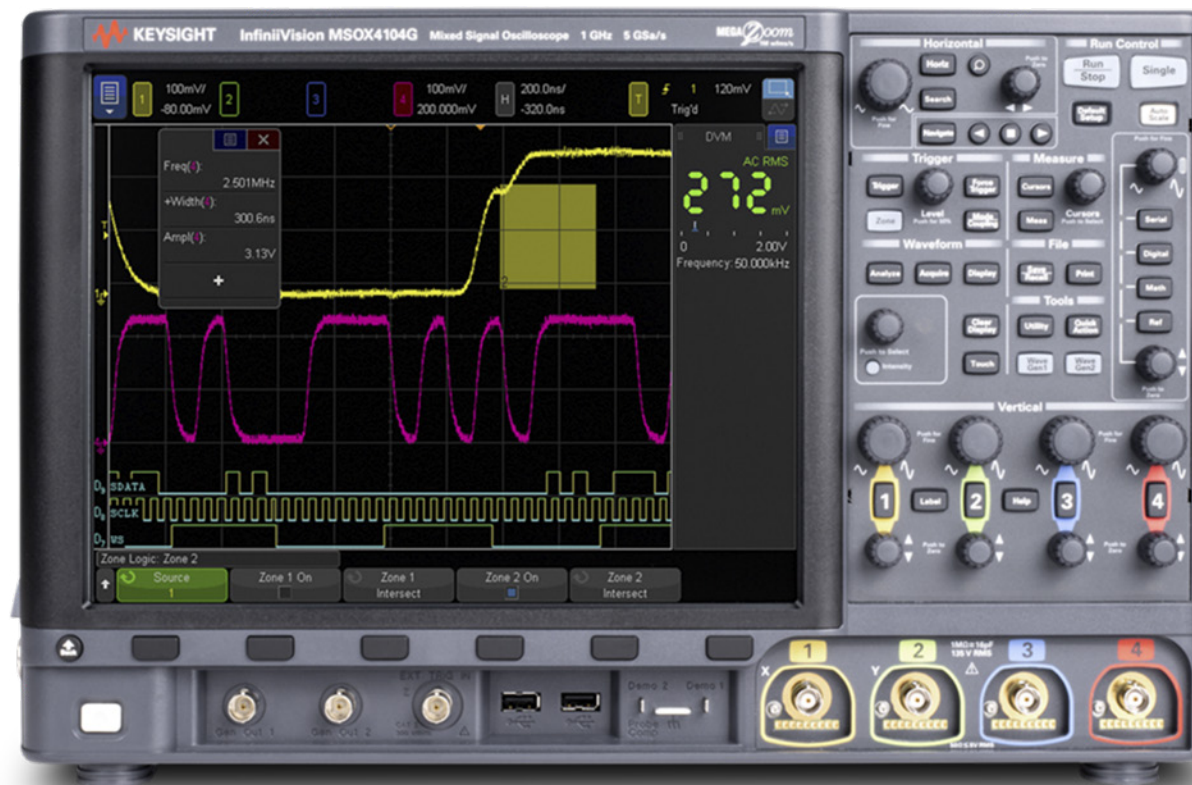
InfiniiVision 4000G X-Series Oscilloscopes

See more of your signal

The Keysight InfiniiVision 4000G X-Series oscilloscopes come with everything you need to start your general-purpose electronic design right out of the box. The included software, probes, advanced features such as histograms and zone touch triggering, and technical support are ideal for R&D debugging, low-speed serial design and testing, and power analysis.

- Trigger and decode on the most common embedded serial buses (I2C, SPI, UART / RS232 / RS485, and USB-PD) with standard embedded analysis software.

- Capture elusive glitches and anomalies with an uncompromised waveform update rate of 1,000,000 per second — our waveform update rate doesn't slow down no matter which measurements, functions, or time base setting you use.

- Perform advanced analysis with histograms, hardware-based mask limit and measurement limit testing, frequency response analysis (Bode plots), and HDTV video analysis.

- Isolate signals in seconds with zone touch triggering using the 12.1-inch touch screen.

- Protect your investment with upgradeability at any time for bandwidth up to 1.5 GHz, 16 digital channels, and application-specific oscilloscope software.

InfiniiVision 4000G X-Series Oscilloscope
Versatility unleashed, possibilities amplified

InfiniiVision 4000G X-Series Oscilloscopes

Specifications		4022G	4024G	4032G	4034G	4052G	4054G	4104G	4154G
Bandwidth		200 MHz		350 MHz		500 MHz		1 GHz	1.5 GHz
Channels	DSOX	2	4	2	4	2	4	4	4
	MSOX	2 plus 16	4 plus 16	2 plus 16	4 plus 16	2 plus 16	4 plus 16	4 plus 16	4 plus 16
Memory		4 M points with segmented memory standard							
Maximum sample rate		5 GSa/s half channels, 2.5 GSa/s all channels							
Waveform update rate		> 1,000,000 waveforms / second							
Integrated instruments		Digital channels (MSO models), serial protocol analyzer, frequency response analyzer (Bode plots), dual-channel 20-MHz arbitrary waveform generator, three-digit digital voltmeter, and eight-digit hardware counter with totalizer							
Rise time (10 to 90%)		≤ 1.75 ns		≤ 1 ns		≤ 700 ps		≤ 450 ps	≤ 300 ps
Serial protocols options		I^2C, SPI, UART (RS232 / 422 / 485), I2S, USB PD, USB 2.0, CAN, CAN FD, LIN, FlexRay, SENT, CXPI, PSI5, user-definable Manchester / NRZ, MIL-STD-1553, and ARINC 429							
Triggering		Zone touch trigger, edge, edge then edge, pulse width (time-qualified) pattern, or rise / fall time, Nth edge burst, runt, setup and hold, enhanced video (HDTV) (option), and various serial buses (optional)							
	DSOX	Get a quote >	Get a quote >	Get a quote >	Get a quote >	Get a quote >	Get a quote >	Get a quote >	Get a quote >
	MSOX	Get a quote >	Get a quote >	Get a quote >	Get a quote >	Get a quote >	Get a quote >	Get a quote >	Get a quote >

Your oscilloscope's waveform update rate matters. Learn how to measure the update rate of your oscilloscope and how it affects the dead time, as well as the probability of capturing glitches with *Why Waveform Update Rate Matters* – White Paper.
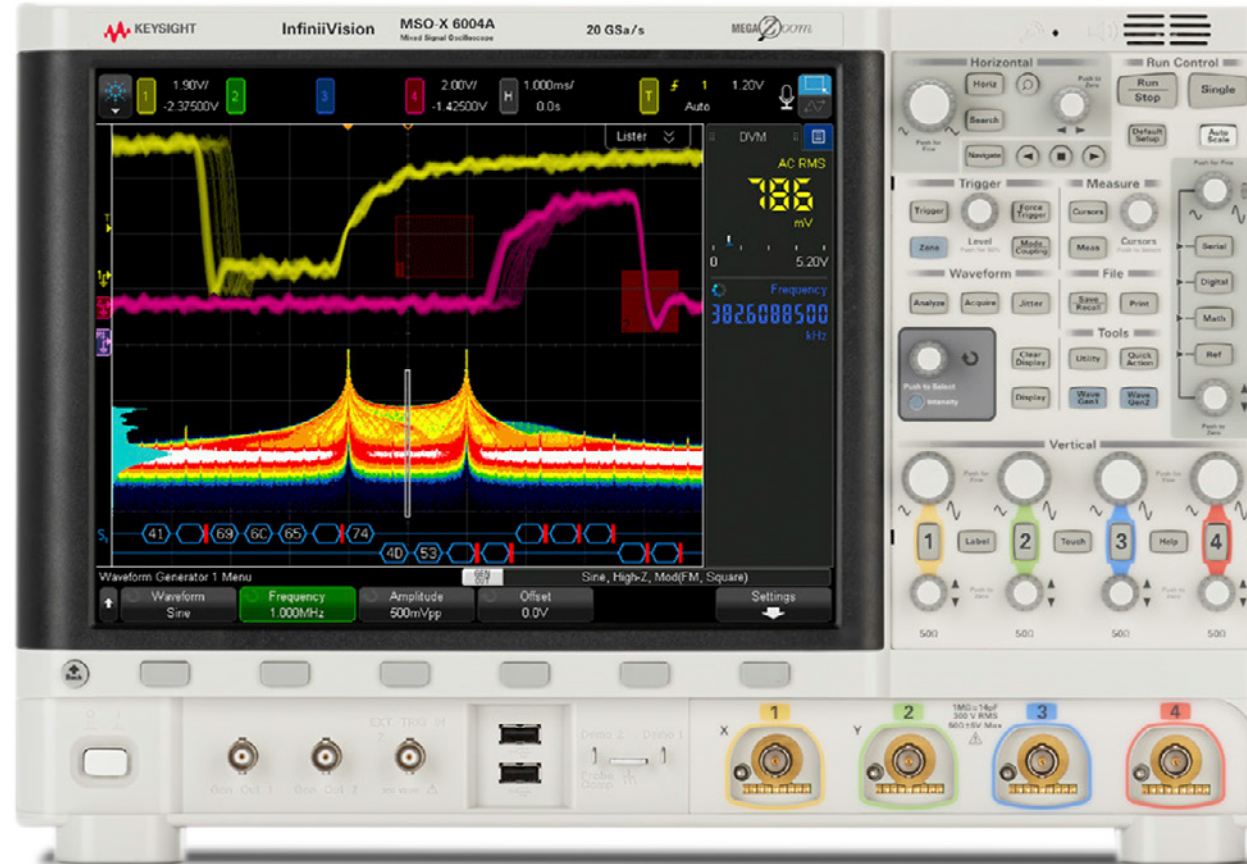
InfiniiVision 6000 X-Series Oscilloscopes

Gain deeper insights

Increase your productivity with the Keysight InfiniiVision 6000 X-Series 7-in-1 instrument integration and multilanguage voice control. The InfiniiVision 6000 X-Series is the new standard in price performance.

- See more signal detail with 450,000 waveforms / second update rate.

- Isolate signals in seconds with zone touch triggering.

- Operate hands-free with multilanguage voice control.

- Get more functionality with optional integrated digital channels, serial protocol analysis, dual-channel WaveGen, frequency response analysis (Bode plots), and 10-digit counter plus 3-digit voltmeter.

- Save 25% on the InfiniiVision 6000 X-Series jitter application bundle. Learn more.

- Protect your investment with full upgradeability; add options and bandwidth at any time.

InfiniiVision 6000 X-Series Oscilloscope
Dive deeper and analyze more signal detail

InfiniiVision 6000 X-Series Oscilloscopes

Specifications	DSOX6002A	MSOX6002A	DSOX6004A	MSOX6004A
Bandwidth	1 to 6 GHz options			
Channels	2	2 plus 16	4	4 plus 16
Memory	4 M points with segmented memory standard			
Maximum sample rate	20 GSa/s half channels, 10 GSa/s all channels			
Waveform update rate	> 450,000 waveforms / second			
Integrated instruments	Digital channels, serial protocol analysis, a built-in dual-channel WaveGen, frequency response analysis, built-in digital multimeter, and built-in 10-digit counter with totalizer			
Noise floor	210-µVrms noise floor at 1 mV / div (6 GHz), 115-µVrms noise floor at 1 mV/ div (1 GHz)			
Serial protocols options	I^2C, SPI, UART, CAN / CAN FD / CAN-dbc, LIN / LIN symbolic, FlexRay, SENT, I2S, MIL-STD1553, ARINC 429, USB 2.0, CXPI, Manchester / NRZ, USB PD			
Triggering	Zone touch trigger, edge, edge then edge, pulse width (time-qualified), pattern, or, rise / fall time, Nth edge burst, runt, setup and hold, enhanced video (HDTV) (option), and various serial buses (optional)			
	Get a quote >	Get a quote >	Get a quote >	Get a quote >

Learn to identify oscilloscope jitter sources and choose the correct way to reduce or eliminate jitter to improve your designs' transmission performance.

Infiniium EXR-Series Oscilloscopes

Discover an 8-channel oscilloscope that is powerful, easy to own, and intuitive to use.

The Keysight Infiniium EXR-Series incorporates a 10-bit ADC with a sample rate of 16 GSa/s available on all channels simultaneously. A high-resolution ADC's usefulness is dependent on the low-noise front end that supports the additional quantization levels. The EXR-Series' low noise front end includes custom ICs, like the 130 nm bipolar CMOS (BiCMOS) IC that incorporates user-selectable analog filters and bandwidth upgrades via a software license.

- Get four times more vertical resolution than eight-bit oscilloscopes.

- Experience high-resolution mode with up to 16 bits.

- Acquire clearer signals with noise as low as 43 μV and 9.0 bits of system effective number of bits (ENOB) with hardware filtering.

- See more data about history mode and segmented memory.

- Protect your investment with full upgradeability; add options, bandwidth, and more channels at any time.


Infiniium EXR-Series Oscilloscope
Powerful. Easy to Own. Intuitive to Use.

Infiniium EXR-Series Oscilloscopes

Specifications		EXR05XA	EXR10XA	EXR20XA	EXR25XA
Bandwidth (-3 db)	**50 Ω**	500 MHz	1 GHz	2 GHz	2.5 GHz
	1 MΩ	500 MHz	500 MHz	500 MHz	500 MHz
Typical rise / fall time	**10 / 90%**	860 ps	430 ps	215 ps	172 ps
	20 / 80%	620 ps	310 ps	155 ps	124 ps
Channels		4 or 8 channels analog, 16 channels digital (optional)			
Sample rate		16 GSa/s, all analog channels			
Memory		Standard: 100 Mpts / channel (all channels) / Optional: 400 Mpts / channel (all channels)			
Integrated instruments		Digital channels, protocol analysis, arbitrary waveform generator (50 MHz), frequency response analysis (50 MHz), 4-digit digital multimeter (10-digit counters), logic analysis (16 channels), and phase noise analysis			
Noise floor		100 µVrms noise floor at 1 mV / div (2.5 GHz), 43 µVrms noise floor at 1 mV / div (20 MHz)			
Serial protocol options		I^{2}C, SPI, Quad SPI, eSPI, RS232, UART, JTAG, I2S, SVID, Manchester, USB 2.0, 10 / 100 Mb/s Ethernet, USB-PD, CAN, CAN-FD, LIN, SENT, FlexRay, RFFE, I3C, SPMI, ARINC 429, MIL-STD-1553, SpaceWire, 100BASE-T1 automotive Ethernet			
Triggering		Edge, edge transition, edge then edge (time / event), pulse width, glitch, runt, timeout, pattern / state, setup / hold, window, protocol, generic protocol, burst, Nth edge, OR'd edges, Zone touch trigger, measurement limit, and non-monotonic edge			
		Get a quote >	Get a quote >	Get a quote >	Get a quote >

Save Hours of Test Time with the New Oscilloscope Feature

Check out the *Quickly Find and Identify Hidden Signal Errors* application note to discover the Keysight Fault Hunter oscilloscope feature that characterizes your signal, finds errors, and pinpoints its location.

APPLICATION NOTE

Infiniium EXR and MXR-Series Oscilloscopes
Quickly find and identify hidden signal errors
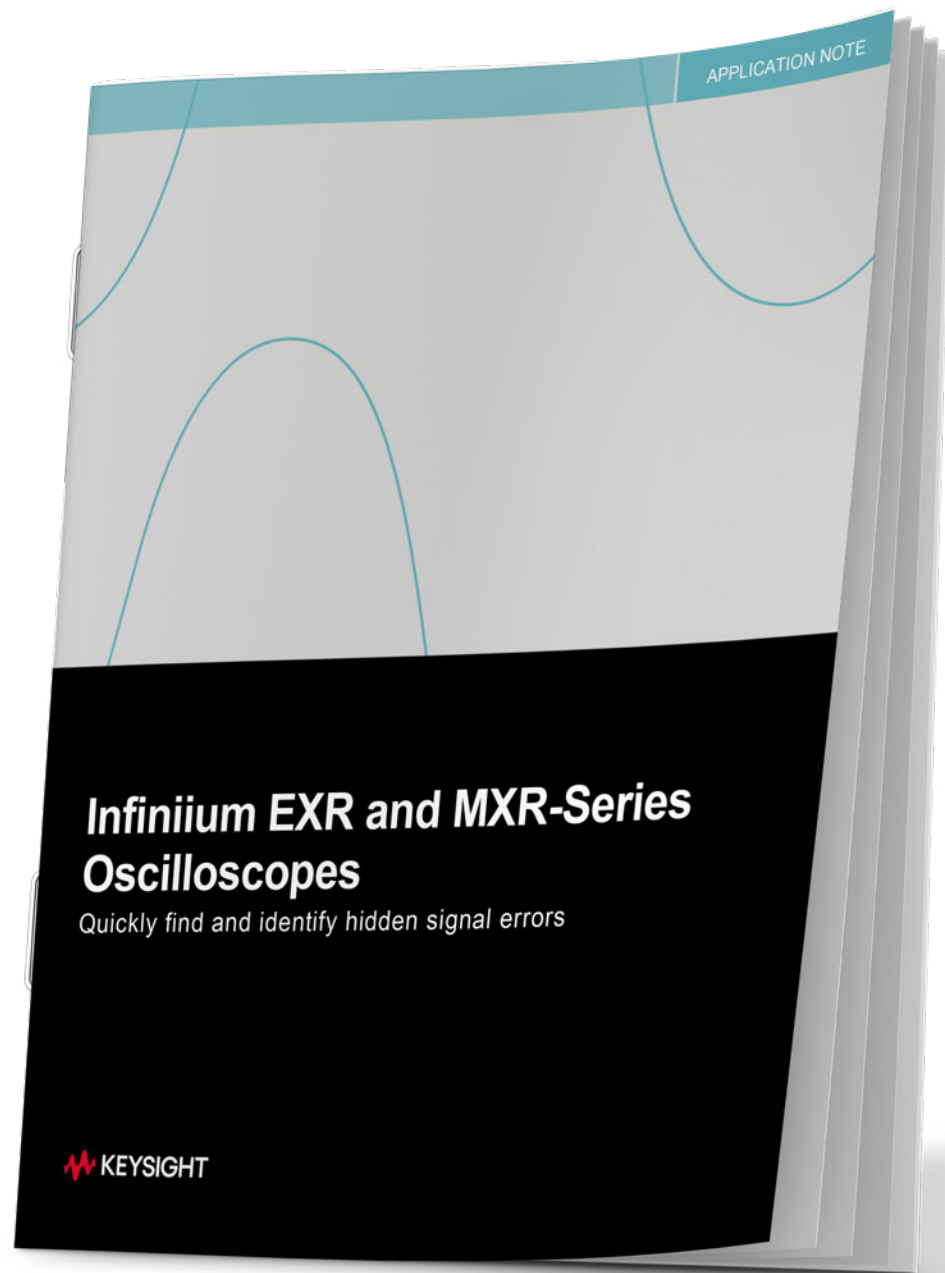
KEYSIGHT

Expand your InfiniiVision oscilloscope's capabilities with powerful application software

You need fast, accurate answers to your measurement questions — that's why Keysight offers a wide range of application-specific oscilloscope software. We engineered these applications to work with your oscilloscope to provide exceptional insight quickly and easily into your signals.
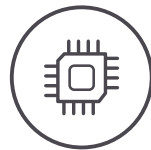
Check out Keysight oscilloscope software. Most of our software is available for a free 30-day trial.

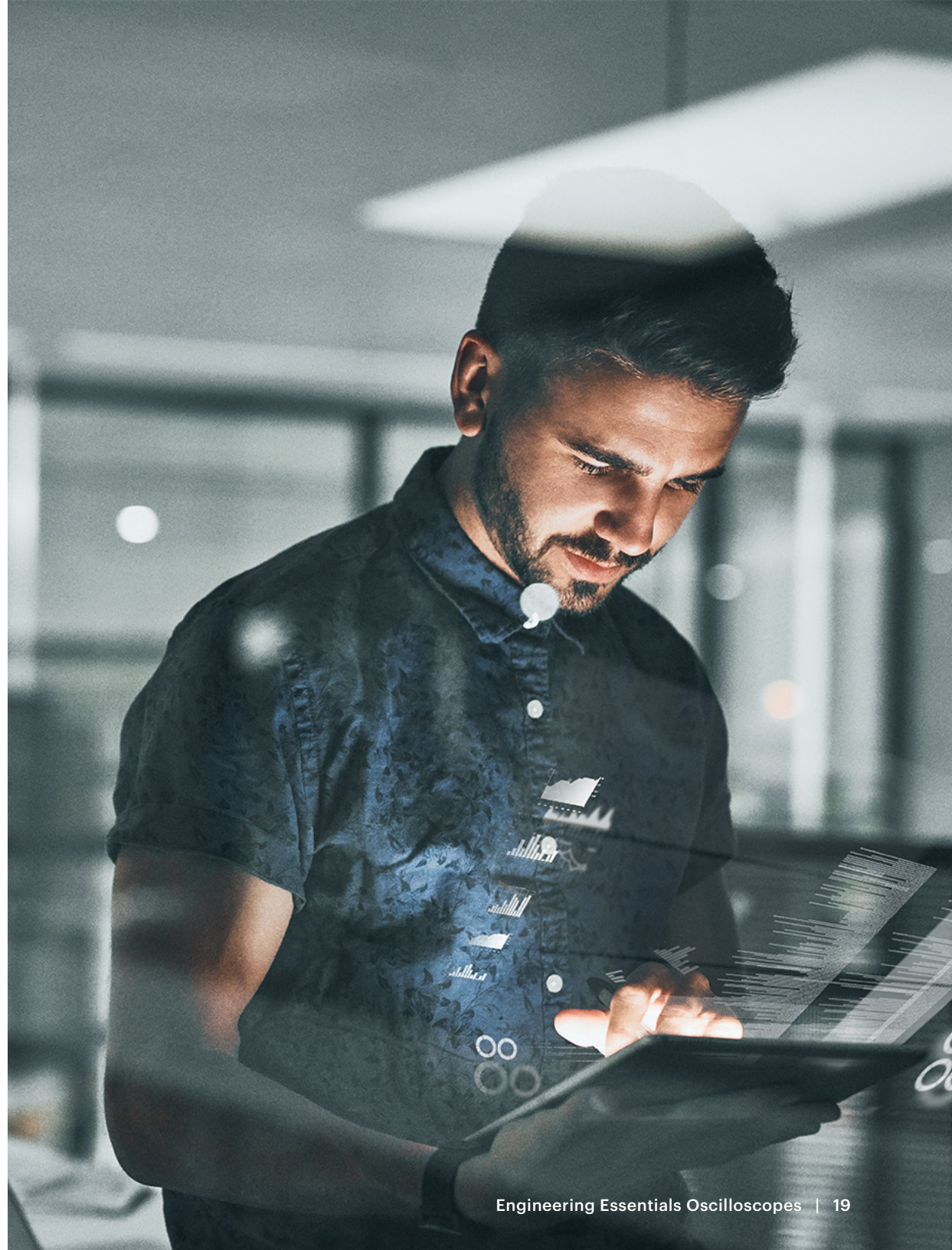|		
Automotive	Aerospace & Defense	Embedded
Power	USB	Ultimate Bundles

Save 25% on InfiniiVision power, jitter, and automotive application bundles. View the bundles.

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